in the martensitic state. Instead of using SMM springs to achieve large rotation, other mechanisms incorporating smart materials to achieve large rotational or linear motion can be used as well.

[0053] In FIG. **6**, a partition, e.g., behind the first row of seats (like the screen in a cab), is wound with a rotational actuator implemented using shape memory materials such as in the scrolling mechanism **20** of FIG. **5**. The two elements **16** sliding in two slots **44** of the vehicle sidewalls are pushed to the slots **44** by the spring **48** located between the rods **16** and therefore hold the partition **40** in position. The partition can extend all of the way, or part of the way, to the ceiling **42**, from the floor **46**. Cargo covers can be deployed/retracted and held in similar fashions.

[0054] Another embodiment of a shape memory material actuator assembly **60** operating as an incremental rotational motor is shown in FIG. **7**. A shaft **62** with an extension or pin **68** is concentric with a hole through a cylindrical housing **64** and rotates with or without the help of a bearing. Shape memory material components **78**, **80**, **82** and **84** are attached to the biased pin **68** at one end, bent over pulleys **70**A-D and **72**A-D and attached to retaining pins at the other end of the cylindrical housing (pins not shown, but FIG. **8** shows the shape memory material components in fragmentary view extending toward the pins). The pulleys **70**A-D and **72**A-D sit on sliders **86**A-D that slide in slots **74**A-D of the cylindrical housing **64**. The shape memory material components **78**, **80**, **82** and **84** can be activated sequentially and therefore rotate the shaft **62** with respect to the cylindrical housing **64**. Since all the shape memory material components **78**, **80**, **82** and **84** are bent (via the pulleys **72**A-D) to extend in the axial direction of the shaft **62**, sufficiently-sized shape memory material components able to achieve large displacement (e.g., shape memory material components of a sufficient length to achieve adequate displacement of the movable member via contraction of each shape memory material component) are enabled while packaging size is minimized. Optionally, to avoid fatigue degradation due to bending of shape memory material components, non-shape memory material portions (e.g., regular metal wire) having long fatigue life can be substituted for any portion of the shape memory material components experiencing bending and shape memory material can be used only in the portion that remains straight throughout the actuation cycle, i.e., the portion nearly parallel to the axial direction of the shaft **62**.

[0055] The sliders **86**A-**86**D ride on a cam lobe **66** of the shaft **62**. The cam profile **76** (shown in the FIG. **8**) allows the slider to which the just-actuated shape memory material component is operatively connected to move toward the center of the shaft **62** and therefore prevents being pulled by the next-actuated shape memory material component. The cam profile **76** therefore utilizes the contraction force of the shape memory material components more efficiently (i.e., utilizes the force to turn the shaft rather than to work against restrictive force of the just-actuated shape memory material component), allows more cooling time before stretching of a previously actuated component, and decreases the cycle time of the actuator assembly **60**. The cam profile **76** can also be made to avoid unnecessary overstretching of the shape memory material components. In FIGS. **7** and **8**, each shape memory material component is only stretched by the opposite actuated shape memory material component (i.e., shape memory material component **84** is stretched when shape memory material component **80** is actuated and vice versa, and shape memory material component **82** is stretched when shape memory material component **78** is activated and vice versa) and the amount of stretch is the same as the amount needed to pull the pin **68** and rotate the shaft **62** when it is actuated.

[0056] Automatic activation can be employed to activate the wires sequentially, thereby reducing or eliminating control logic for this activity, and therefore reducing the cost. By providing an electrical contact strip only partially extending around the cam surface (similar to electrical contact strip 535 illustrated in FIG. 12 of commonly assigned U.S. patent application Ser. No. 11/501,417 filed on Aug. 9, 2006, Attorney Docket No. GP-307896-R&D-KAM), the respective shape memory material components will be activated sequentially as the shaft **62** rotates. In the case of using regular metal wires in the bending area, the wires attached to the post at the distal end of the scroll, with all connected to the negative pole and the positive end connected to the cam, with only a portion of the cam surface electrically conductive. Note the pulleys **70**A-D and **72**A-D and the sliders **86**A-D are conductive, and the biased pin **68** is not conductive. Power off holding is desirable and it can be realized via a ratcheting or locking and releasing mechanisms.

[0057] Note, in the shape memory material actuator assembly **60**, the number of shape memory material components is not limited to four. There could be only three shape memory material components or more than four. Furthermore, the slots **74**A-D are not limited to the configuration shown. The centerline of the slots does not necessarily pass through the shaft center and is not necessarily straight. In addition, both clockwise and counterclockwise rotation can be equally achieved in the mechanism. Moreover, to reduce response time and decrease cooling time while maintaining required force, several thinner SMM components can be used in place of each shape memory material component (e.g., several smaller diameter SMM wires in place of each single SMM wire) to connect the distal end.

[0058] FIG. **9** illustrates another displacement mechanism that can be employed to deploy a cover. In this embodiment, the shape memory material (e.g., SMA) is used to provide a small angular displacement, while the mechanism converts the small displacement to a large displacement. For example, a gear case can be used to amplify the angular displacement. For example, 1 revolution equals $2\pi r$ which equals the displacement divided by the revolutions. Hence, if the radius (r) is 0.5 inches, then there is 3.14 inches of displacement produced per revolution of the input shaft **94**, and approximately 5 revolutions of the input shaft would be needed to displace 16 inches of a cover. If the mechanism between input shaft and output shaft were to gear up (gear box) to a 1:10 ratio, then half a revolution would turn the output shaft 5 revolutions. If the output shaft **96** has a radius (r) of 0.5 inches, 5 revolutions of the output shaft **96** would displace about 16 inches of cover; and if output shaft **96** has a larger radius, less rotation is needed at the input shaft. Therefore, only a small amount of SMM wire can be used to actuate the shade, lower power is used from the vehicle, and the SMM displacement is amplified.

[0059] In yet another embodiment, a flywheel can be employed where the shape memory material(s) are used to give angular momentum to a flywheel which is used to deploy/stow a curtain. A disk with high mass can use a shape memory material (e.g., SMA) acting near the center of the disk at a diameter much smaller than the outer diameter (OD)